



NEWSLETTER

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FRATRICIDE: REDUCING SELF-INFLICTED LOSSES



**CENTER FOR ARMY LESSONS LEARNED (CALL)
U.S. ARMY COMBINED ARMS COMMAND (CAC)
FORT LEAVENWORTH, KANSAS 66027-7000**

FOREWORD

The risk of fratricide has always been a consequence of war. Recent combat operations and trends at the Combat Training Centers (CTCs) indicate that friendly fire casualties are an increasing peril of modern warfare.

This newsletter reviews the most significant trends in ground-to-ground and air-to-ground fratricide and proposes practical remedies. It provides useful Tactics, Techniques and Procedures (TTP) as training tools for maneuver leaders at all levels. Our CTCs show consistently that failures during planning, preparation and rehearsal are predictive of failure in execution. This is particularly true of fratricidal exchanges--our most tragic failures in execution.

To synchronize the group effort, leaders must step back and review the sequence and relative importance of events. When our careful assessment of mission, enemy, terrain, troops and time available (METT-T) implies elevated levels of operational risk (to include potential fratricide), we as leaders **must** incorporate risk reduction measures in planning. As an example, if synchronization and mission success, with minimum casualties, depend heavily upon accurate and efficient navigation, then navigation is a high risk area. In this a case a commander cannot delegate navigation to one or two key players. Despite known ability, any individual might fail. The commander must employ precise, redundant, and reliable measures and rehearsals to assure effective navigation. The same principle applies to effective direct fire planning and control. **The key to solving fratricide problems is detailed planning and rehearsals to minimize predictable risks.**

I encourage leaders to adapt these or similar tools to your platoon and company troop- leading steps and to the battalion and brigade orders drill. Address fratricide as one important dimension of the operational risk assessment that accompanies every undertaking. Consider self-inflicted losses in training just as intolerable as those in combat.

TRAIN TO FIGHT!

MICHAEL S. DAVISON, JR.

Brigadier General, USA

Deputy Commanding General for Training

FRATRICIDE: REDUCING SELF-INFLICTED LOSSES

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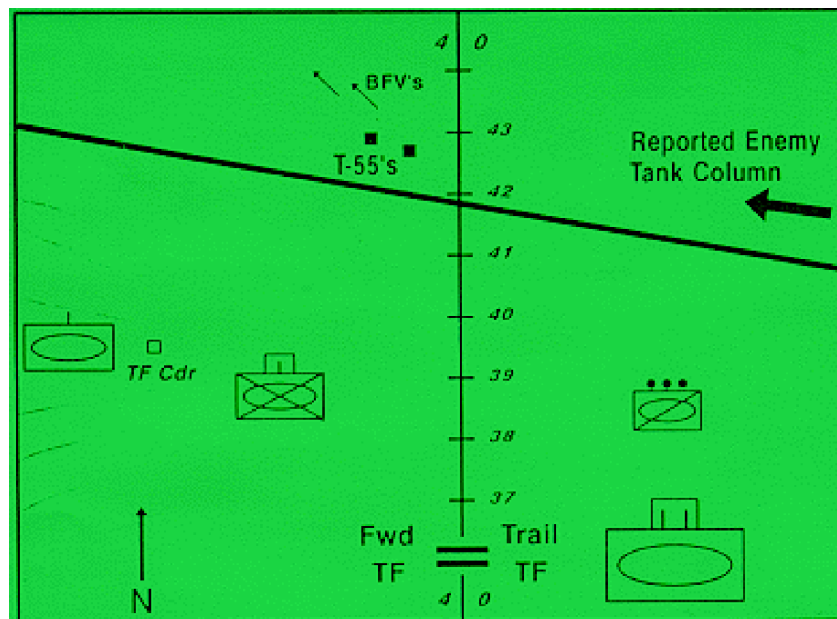
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Unless otherwise stated, whenever the masculine or feminine gender is used, both are intended.

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Vignette: OPERATION DESERT STORM: ACTIONS ON DAY G + 3

At 1400 on 26 February 1991, a U.S. armor task force consolidated its position and oriented north on a small desert hill to allow the task force on its right to catch up. Visibility was under 1500 meters due to fog, dust, and smoke. Spot reports from higher indicated an enemy column of 20 tanks was crossing the brigade front from the east. At this time, the trailing task force in the right reported being stationary and over 2 kilometers behind the forward battalion on the left. Spot reports further confirmed the trailing unit's Scouts were in zone and no further north than the forward battalion's positions (vicinity the 39 grid line). Two T-55s then appeared along a road 2500 meters to the forward unit's front and adjacent to its right boundary. Upon confirmation, these two tanks were destroyed, one by the task force commander's tank from his right flank vantage point.



The 40 N-S Gridline is the TF Boundary

A short time later, brigade reemphasized the threat of an enemy tank column from the east and cautioned the commander to be prepared. The trailing battalion reconfirmed it's location south of the 37 grid line, with Scouts vicinity the 39 grid line. During this time the forward battalion continued to have contact and enemy engagements among it's left flank company teams. Then a tank platoon from the right flank of the forward battalion reported two more vehicles vicinity the brightly burning T-55s and moving in a direction consistent with the brigade spot report. The task force commander gave a fire command to that company and initiated a 2700 meter engagement with his own tank. Within moments, his gunner, SSG Michael Duda, exclaimed over the intercom: "Sir, there is something wrong here!" His commander immediately transmitted a cease fire. Fortunately no one engaged the vehicles. SSG Duda had recognized the "hot" roadwheel thermal signature characteristic of the Bradley Fighting Vehicle (BFV). Quick investigation confirmed this was a misoriented Scout section from the adjacent battalion, and almost 4000 meters forward of the reported positions.

SSG Duda, ultimately credited with five tank kills during Operation DESERT STORM, terminated an almost certainly lethal engagement as a result of his excellent experience and training. Positive command and control in the battalion likewise averted any tragic shot from neighboring vehicles. Honor graduate of his Master Gunner's Course, SSG Duda benefitted from many hours on the Unit Conduct-of-Fire Trainer (the UCFT which replicates the "hot" roadwheel BFV signature) as well as from field experience.

CHAPTER I

INTRODUCTION AND HISTORICAL PERSPECTIVE

"Fratricide is the employment of friendly weapons and munitions with the intent to kill the enemy or destroy his equipment or facilities, which results in unforeseen and unintentional death or injury to friendly personnel." --TRADOC *Fratricide Action Plan*

The goal of this newsletter is to help trainers develop skills and identify techniques which can reduce the fratricide potential of circumstances such as those faced by U.S. forces in recent combat operations. Thus, this newsletter focuses on lessons available from previous historical and Combat Training Center (CTC) studies as well as on observations from the Operations JUST CAUSE and DESERT STORM After Action Reports (AARs). It is also designed to compliment CALL handbook No. 92-3, Apr 92, *Fratricide Risk Assessment for Company Leadership*.

Fratricide is a grim fact in combat operations. Such incidents cover a wide spectrum of conditions, but, historically, are most likely to occur in the early stages of combat, during reduced visibility or along shared unit boundaries. In previous 20th century conflicts, supporting fires (air and artillery) accounted for almost 75 percent of fratricide incidents and an even greater proportion of friendly fire casualties (see Appendix D, 20th Century Fratricide Statistics). However, with current direct fire technology advances, this proportion may be changing for modernized armored forces in high intensity scenarios.

Recent combat operations show that the nature of future fratricide risk may be dependant upon the specific theater and enemy encountered. As examples, Operation JUST CAUSE and Operation DESERT STORM are at opposite ends of the scale in several respects. Other factors may include the degree to which maneuver success is reliant upon fire support and the proportion of offensive to defensive missions. **Theater characteristics lead to quite different command and control challenges and will vary with any given conflict.**

JUST CAUSE	THEATER-DEPENDENT FACTORS	DESERT STORM
Very Short	Engagement Ranges	Beyond ID Range
Urban and Jungle	Urbanization and Terrain	Nonurban and Desert
U.S. Joint	Joint and Allied Cooperation	Coalition
Minimal	Preparation and Acclimation	Extensive
Detailed	Enemy Situation	Variable (at front)
Long Term	Local Friendly Presence	None
Small Unit Action	Array of Forces	Operational Maneuver
Low Density	Density of Forces	High Density

OPERATION JUST CAUSE

During Operation JUST CAUSE, the vast majority of reported incidents involved the collateral effects of friendly weapons in urban and restricted terrain. Soldiers didn't know the penetration, ricochet, and blast consequences of their own weapons. Ricochets, inexact ground locations, and incomplete identification by aircraft were factors in the two known air-to-ground incidents. In each case, ground elements cleared fire after either receiving incorrect information or moving after processing the call for fire.

OPERATION DESERT STORM

During Operation DESERT STORM, **direct fire vehicular engagements caused 12 of the 15 Army friendly fire incidents.** Of these 12, all but one occurred at night. The majority (up to 10 incidents) appear to have occurred within 1,500 meters, but conditions almost universally included significant obscuration from dust, smoke, rain, and fog. Four incidents occurred across task force boundaries. Other **contributing factors** characteristic of DESERT STORM (for more on contributing factors, see discussion in Chapter 2 and Appendix A) include the intense, continuous pace of operations, vast distances traveled over featureless terrain, and the high number of limited visibility, shoot-on-the-move engagements. Although coalition thermal sights greatly over-matched the Iraqi capability, many misidentification problems still arose. On the unrestricted desert battlefield, direct fire lethality far outstripped the gunner's ability to achieve **positive target identification.** Hence, he based his decision to fire largely upon his knowledge of where he and other friendlies were, or should have been, with respect to a given target. This **situational awareness**, dependant upon planning and control measures, became key to understanding DESERT STORM fratricide incidents. There were also two air-ground incidents, and one indirect fire incident where a premature burst of artillery DPICM killed a soldier.

The two fratricidal air-ground engagements were primarily due to the same kind of confusion about relative positions, compounded by misidentification. Aircraft drifting outside their division boundaries resulted in at least one corps--wide order to ground all Army aircraft and regain control during the ground war. Other problems included widespread disregard for air defense control measures and guidance. Only great professional restraint on the part of air defenders prevented any tragic engagements of coalition aircraft. With a significant enemy air presence in the future, this might not hold true.

The primary role of supporting fires in Operation DESERT STORM was to shape the battlefield in the days prior to G-Day and to strike withdrawing targets during the ground war. **Effective long-range direct fire engagements and the propensity for the enemy to retreat kept direct support artillery fires well away from units in contact.** Other than the generation of dud submunitions, the risk of artillery fratricide was abnormally low.

Although no casualties resulted, the risk of fratricide in rear areas became evident during Operation DESERT STORM. We saw that the combat support and combat service support elements contacted and bypassed EPWs, displaced civilians, and even enemy elements still capable of fighting. **Against an enemy more willing to fight in our rear area, this could cause major fire control and coordination problems.**

As with other 20th century conflicts, DESERT STORM fratricide casualties have often been expressed as a fraction of all friendly casualties (107 friendly fire casualties of 615 total WIA and KIA, or 17 percent). Although these two numbers are dramatically and readily available, they are not necessarily the best historical means to record fratricide. Our fire control failures are more appropriately expressed as a percentage of total effective friendly engagements (the total number of enemy and friendly casualties we inflicted). For example, we tragically killed 35 and wounded 72 American service members in the legitimate effort to inflict conservatively 20,000 casualties upon the enemy. Although this perspective by no means lessens our obligation to reduce these incidents, our actual rate of fratricide during DESERT STORM was probably well under 1 percent. **In future conflicts, the best predictor of fratricide risk may be a function of the projected number of engagements and not a function of our projected casualties.**

COMBAT TRAINING CENTER (CTC) TRENDS

The Army's CTCs routinely track fratricidal engagements. A July 1990 study at the *Joint Readiness Training Center (JRTC)* showed that almost 7 percent of all friendly fire casualties in the previous year resulted from friendly fire. Characteristically, these occurred in close combat situations, with 81 percent due to indirect fire and only 19 percent due to direct fire. This fire support hazard resulted from many dismounted elements moving separately in limited visibility and the employment of danger-close missions in support of light maneuver. These fires are often unobserved and cleared by company commanders, battalion S3s, and battalion or company FSOs. However, unit performance at the JRTC since this 1990 study indicates that the proportion of indirect fire fratricide is decreasing. Just **since Operation DESERT STORM, fratricide overall is down approximately 40 percent, with a dramatic reduction in indirect friendly fire** (now almost equal to direct fire fratricide). Observers attribute this trend to the improved exercise of positive clearance of fires by ground commanders.

The Center for Army Lessons Learned (CALL) and the Army Research Institute (ARI) conducted detailed studies of direct fire computer records from 1986-1990 at the highly instrumented *National Training Center (NTC)*. Results indicated that under some conditions as many as 10.9 percent of attempted engagements were fratricidal. Generally, just over one half of these engagements (52 percent) resulted in MILES hits/kills (versus near misses) and hence casualties (see Appendix E for breakout and rank order by mission). Based upon our DESERT STORM experience, this probably under-represents the lethality of direct fire service ammunition. Keep in mind the computer profile only represents a fraction of actual engagements and the specific fratricide percentages are not necessarily representative of all engagements. We can, however, draw several conclusions. First, likelihood of fratricide is lower in defense operations, which becomes useful information in operational risk assessment. Deliberate attacks involve the highest fratricide risk for offensive missions. **Although characterized by thorough preparation and detailed intelligence, the massing of units and the high density of weapons systems in a deliberate attack create the greatest likelihood of fratricide.** Less structured offensive operations (hasty attack and movement to contact) generally make contact with the smallest feasible element and employ simple, one axis formations to enhance command and control. Finally, like the majority of all direct fires, most friendly fire engagements occur within 1500 meters. However, although **the volume of engagements beyond 2000 meters drops, the proportion that are fratricidal increases.** This reflects the problem of long range combat identification.

Ultimately in this study, the computer registered about 5 percent of recorded friendly direct fire MILES hits and kills at the NTC as fratricidal (see Appendix E for breakdown by mission). Although computer recorded hits are only a fraction of total engagements, comparison of rates by mission is impossible. Friendly fire rates in the offense exceed those in the defense by 3:1; however, the higher volume of engagements in the defense produces almost as many friendly casualties as in the offense (e.g., 5 percent of 300 hits in the defense equals 15 percent of 100 hits for offense). Thus, the average self-inflicted toll at the NTC per task force mission may be as high as two to three combat vehicles. These statistics apply equally to modernized and nonmodernized forces.

An earlier study (1986) conducted by the Rand Corporation involved 83 direct fire battles and 15 task forces. **It demonstrated that good situational awareness at the lowest level is the key to preventing the majority of fratricide given the lack of an effective IFF system.** This study reported several conclusions. First, most direct fire fratricides are isolated incidents involving one engagement. Of the relatively few incidents involving multiple engagements, 75 percent occur in darkness. Second, 50 percent of shooting vehicles could have avoided fratricide if they had only known the location of their sister units. Another 33 percent would have needed to know the location of individual and isolated friendly vehicles not in contact with the enemy. The remaining 16 percent would have required an IFF device to distinguish friendly vehicles intermixed with the enemy.

The Rand Study also investigated **indirect fire** and found fratricidal missions in 51 of 116 battles reviewed. On average, task forces fired 26.7 missions per battle (excluding smoke and illumination) with 33 percent achieving at least some suppression of forces on the ground. **About one tenth of these "effective" missions or 3.6 percent of total missions were fratricidal.** Of interest, there was only a small deviation between kinds of operations (offense vs. defense) and between units with and without TACFIRE. However, the difference between training units was significant. The best task forces had fratricidal fire missions in only 25 percent of their battles, while some had friendly indirect fire in every battle. Unfortunately, these figures do not readily translate to casualty estimates for comparison with direct fire casualties.

The *Combat Maneuver Training Center (CMTC)* at Hohenfels reports similar unit problems with fratricide. After Action Reports often link **poor quality rehearsals and lack of crosstalk** to command and control breakdowns causing fratricide. Unlike the desert, **short direct fire engagement windows and decision times contribute to vehicle identification problems.** Friendly indirect fire results from not clearing target areas and violating danger close. Additionally, the continuity of friendly unit operations in the maneuver area reveals many problems with casualties from friendly minefields. These stem from failure to coordinate and disseminate the obstacle plan and failure to accurately report obstacle locations back up the chain.

The simulation which supports the *Battle Command Training Program (BCTP)* does not have sufficient resolution to game direct fire fratricide, but the simulation does portray friendly fire casualties from artillery, Army aviation, air support and minefields. Typically, forces in the security zone are not protected by restrictive Fire Support Coordination Measures (FSCMs) and become engaged by USAF or indirect fires. Similarly, friendly maneuver units are engaged after crossing a permissive FSCM that has not been updated, such as a Fire Support Coordination Line (FSCL). As with the CMTC, units moving through another's area of operations often experience minefield fratricide. **Observers find that fratricide is minimized when units properly monitor, mark, and report barriers, adhere to obstacle restrictive measures, and conduct detailed movement coordination, to include route reconnaissance.**

Vignette: OPERATION URGENT FURY: AIR SUPPORT

During a daylight movement to contact, the lead company in an infantry battalion received automatic weapons fire from buildings on high, relatively open ground several hundred meters to its left flank. Navy fighter-bombers were orbiting nearby and responded to a call for fire support. Two aircraft made an initial approach along the axis of the ridge in question to confirm the target. The ground element confirmed their orientation, but due to the proximity of friendlies, they made a second trial approach to absolutely assure themselves. On the third run, the infantry took cover, but observed that for the first time the aircraft oriented on a hill further to the rear and fired the ordnance. In the absence of positive ground marking, a friendly command and control element suffered severe casualties including one soldier killed.

In retrospect, the care taken with dry runs could have been complimented with a near-ground impact artillery flare, a mortar WP mission, M203 smoke, or any one of several other positive means of marking the target. Also, positive marking of friendlies, such as VS-17 panels or colored smoke, could have made a difference. Recent combat operations point out that more than ever before, training must give leaders the seasoning that their predecessors acquired at too high a price.

CHAPTER II

FRATRICIDE - CAUSE AND EFFECT

Responsibility for reducing the risk of fratricide falls squarely on the shoulders of the task force commander. Yet, all leaders of the maneuver task force and leaders of supporting arms must assist him to accomplish the mission without friendly fire losses. He must exploit all training, material, and technological alternatives at his disposal. He must not be afraid of fratricide, but strive to minimize it through tough, realistic, combined arms training where each soldier and unit achieves the set standard. **All leaders must know the standard and relentlessly train to that standard.** Training properly allows us to make mistakes, correct them and, thus, reduce their likelihood in combat. Avoiding fratricide is an important training standard and key to effective mission accomplishment. Knowing where our soldiers are, and where we want the fire, will help keep our soldiers alive to kill the enemy. **We must avoid at all costs the reluctance to employ, integrate, and synchronize all the battlefield operating systems at the critical time and place.**

We will now discuss causes of fratricide in terms of the following two kinds of capabilities introduced by the TRADOC-AMC Task Force on Combat Identification. They are:

SITUATIONAL AWARENESS:

The real-time accurate knowledge of one's own location (and orientation), as well as the locations of friendly, enemy, neutral, and noncombatants. This includes awareness of the METT-T conditions that affect the operation.

POSITIVE IDENTIFICATION:

The immediate, accurate, and dependable ability to discriminate through-sight between friends and foe. Optimally this ability extends to maximum engagement and acquisition range, and neither increases vulnerability, nor decreases system performance.

"Lack of positive target identification and the inability to maintain situational awareness in combat environments are the major contributors to fratricide. If we know where we are and where our friends are in relation to us, we can reduce the probability of fratricide. If, in addition, we can distinguish between friend, neutral, and enemy, we can reduce that probability even more."

-- TRADOC-AMC Combat Identification Interim Report

PRIMARY CAUSES OF FRATRICIDE

SITUATIONAL AWARENESS:

- * **Inadequate Fire and Maneuver Control:** Units may fail to disseminate (via troop-leading procedures and rehearsals) the minimum necessary maneuver and fire support control measures to coordinate activities on the ground. Units fail to tie control measures to recognizable terrain and events or, where necessary, create a recognizable feature. Improper use or inconsistent understanding can likewise make control measures ineffective. As the battle develops, the plan cannot address obvious enemy moves as they occur and synchronization fails.
- * **Direct Fire Control Failure:** Defensive and particularly offensive fire control plans may not be developed or may fail in execution. Some units do not designate target reference points, engagement areas, and priorities. Some may designate, but fail to adhere to them. Weapons positioning can be poor, and fire discipline can break down upon contact.
- * **Land Navigation Failures:** Never easy, navigation is often complicated by difficult terrain or weather and visibility, navigation problems can cause units to stray out of sector, report wrong locations, become disoriented, or, employ fire support weapons from wrong locations. As a result, friendly units may collide unexpectedly or engage each other erroneously.
- * **Reporting, Crosstalk and Battle Tracking Failures:** Commanders, leaders and their CPs at all levels often do not generate timely, accurate, and complete reports or track subordinates as locations and the tactical situation change. Commanders are, therefore, unable to maintain situational awareness. This distorts the picture at each level and permits the erroneous clearance of support forces and violations of danger close.
- * **Known Battlefield Hazards:** Unexploded ordnance, unmarked and unrecorded minefields, FASCAM, flying debris from discarding SABOTs or illumination rounds, and booby traps litter the battlefield. Failure to mark, record, remove, or otherwise anticipate these threats leads to casualties.

POSITIVE IDENTIFICATION:

- * **Combat Identification Failures:** Vehicle commanders, gunners and attack pilots distinguish friendly and enemy thermal and optical signatures near the maximum range of their weapons systems. However, our tactics lead us to exploit our range advantage over the enemy. During limited visibility, or in restricted terrain, units in proximity can mistake each other for the enemy due to short engagement windows and decision time. We do not have a means to determine friend or foe, other than visual recognition of our forces and the enemy's. When the enemy and our Allies are equipped similarly, and when the enemy used U.S. equipment, the problem is compounded.

OTHER:

* **Weapons Errors:** Lapses in unit and individual discipline or violations of the Rules of Engagement allow errors that are not merely accidents. Examples are out-of-sector engagements, unauthorized discharges, mistakes with explosives and hand grenades, charge errors, incorrect gun data and similar incidents.

Although every incident of fratricide is a function of many **contributing factors** or **preconditions** (see comprehensive list at Appendix A), the specific causes as we have discussed are relatively few. Contributing factors, such as anxiety, confusion, bad weather, and inadequate preparation, may greatly increase the chances of a navigation error that causes fratricide. Short planning time, failure to rehearse, and leader fatigue, are other preconditions which may result in a fatally flawed direct fire plan or lack of appropriate maneuver control measures. **Every mission will involve a unique mix of these factors and their relative importance will vary.** In other cases, favorable conditions will compensate for a fratricide contributing factor (e.g., bright moonlight mitigates navigation and control challenges) or two otherwise minor conditions may combine to greatly increase risk (inexperienced flank platoon leader develops commo problems). **Thus, these contributing factors are a critical dimension of realistic training conditions.**

PRIMARY FRATRICIDE CONTRIBUTING FACTORS	
Mission (& C²) <ul style="list-style-type: none">● High Vehicle or Wpns Density● Cdr's Intent Unclear or Complex● Poor Flank Coordination● Crosstalk Lacking● No Habitual Relationships	Troops & Equipment <ul style="list-style-type: none">● High Weapons Lethality● Unseasoned Ldrs or Troops● Poor Fire Control SOPs● Incomplete ROE● Anxiety or Confusion● Failure to Adhere to SOPs
Enemy <ul style="list-style-type: none">● Weak Intelligence or Recon● Intermingled With Friendly	Time <ul style="list-style-type: none">● Soldier and Leader Fatigue● Inadequate Rehearsals● Short Planning Time
Terrain <ul style="list-style-type: none">● Obscuration or Poor Visibility● Extreme Engagement Ranges● Navigation Difficulty● Absence of Recognizable Features	
<hr/>	
LEAD TO THESE PRIMARY FRATRICIDE CAUSES:	
<ul style="list-style-type: none">◆ A Fatal Navigation Error◆ Loss of Fire Control -- Direct & Indirect◆ A Reporting, Battle Tracking or Clearance of Fires Error◆ Ineffective Maneuver Control◆ Casualties in Friendly Minefields◆ Combat Identification Errors◆ Weapons Errors or Failures in Discipline	

EFFECTS OF FRATRICIDE

The effects of fratricide can be devastating and spread deeply within a unit. Fratricide increases the risk of unacceptable losses and the risk of mission failure. Fratricide seriously affects the unit's ability to survive and function. Observations of units experiencing fratricide include:

- Hesitation to conduct limited visibility operations.
- Loss of confidence in the unit's leadership.
- Increase of leader self-doubt.
- Hesitation to use supporting combat systems.
- Oversupervision of units.
- Loss of initiative.
- Loss of aggressiveness during fire and maneuver.
- Disrupted operations,
- Needless loss of combat power.
- General degradation of cohesion and morale.

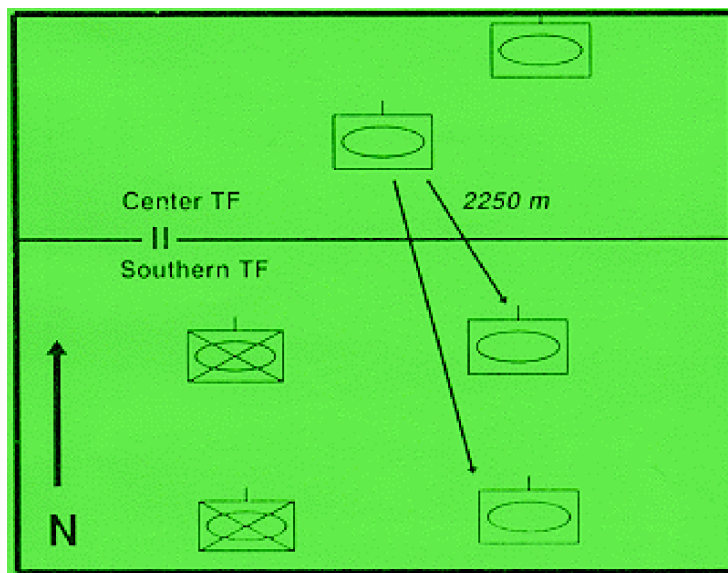
FRATRICIDE RISK ASSESSMENT IN PERSPECTIVE

The tactically competent and savvy leader must consider the risk of fratricide, take appropriate common sense measures to reduce the risk, and integrate those measures into his mission planning and execution. Combat is inherently risky, but the prudent leader takes reasonable measures to reduce the risk. Good commanders are careful not to place undue emphasis on risk avoidance and thus increase timidity and hesitance during battle. We fight and win by focusing overwhelming combat power on the enemy from three or four different systems, thus, giving him several different ways to die all at once. **Sensitivity to fratricide risk reduction should not deter this focus on decisive, integrated, combined arms engagements.**

Vignette: OPERATION DESERT STORM: ACTIONS IN A MOVEMENT TO CONTACT

At 0500 on 27 Feb 1991, a balanced mechanized task force in box formation moved to contact on the right flank of a brigade wedge formation moving east. Although very dark, there was no obscuration of the battlefield and all companies maintained accurate position in the brigade wedge by GPS headings along east-west gridlines. The brigade had long since outrun the operational graphics and maintained control primarily by formation. Subsequent investigation confirmed all unit positions were in accordance with the plan. Contact through the night had been heavy, but became sporadic as dawn approached.

The right flank company in the center task force trailed the lead tank company in the southern task force, maintaining a distance of 2-3 kilometers. In the confusion caused by enemy-dismounted contact within the brigade, this company acquired friendly vehicles in the southern task force's lead tank company. Amidst reports that enemy vehicles were engaging them (this may have been RAG fire impacting vehicles in the southern TF sector), gunners engaged the friendly vehicles to their south. All the vehicles involved in the exchange were moving.



Brigade Formation Moving East

In one engagement, the near tank company commander's tank was hit in the turret by an M1A1 sabot round. The tank shut down immediately, and the commander ordered evacuation. Himself wounded, he began trying to extract the mortally wounded gunner from the top of the turret, when a second round impacted the tank hull. Thrown to the ground, the commander now noticed flame erupting from the driver's hatch and turret hatched. By this time the lightly wounded loader and driver were off the tank, and within seconds a third round impacted the tank hull. This precluded further approach of the tank. As an immediate result of this one engagement, the gunner was killed and the company commander with remaining crew was out of the fight. The tank itself burned for one hour and 45 minutes before exploding ammunition completely destroyed it. In simultaneous engagements, four other tanks in the task force were hit for a total of two vehicles destroyed, one KIA, and seven WIA.

This fratricide incident significantly impaired the combat power and effectiveness of both units involved. Despite redundant and adequate maneuver control measures, direct fire control and discipline lapsed. Although instructions allowed no engagements beyond 2000 meters, it appears some shots violated this guidance. Contributing factors were visibility (50m with night vision goggles), turret orientation, thermal identification, fatigue and RAG explosions mistaken for main gun signatures. Keep this incident in mind when reviewing the reduction measures in Chapter 3.

CHAPTER III

FRATRICIDE REDUCTION MEASURES AND LESSONS LEARNED

This chapter provides tactics, techniques, and procedures (TTP) broken out by the subject areas of doctrine, training, organization, material, leader and soldier development (DTOMLS). Like any component of field or tactical SOPs, units must **tailor and practice these skills constantly during collective training opportunities**. This will hone leader abilities at all levels to accurately predict and compensate for possible fratricide risk. **Ultimately the only effective techniques will be those soldiers understand, innovate and refine themselves, practice frequently, and integrate into unit SOPs.**

TRADOC has developed a Fratricide Action Plan and the Combined Arms Command Training (CAC-T) at Fort Leavenworth is the overall proponent. This action plan coordinates and directs service school's efforts to resolve recognized shortfalls in DTOMLS products relating to prevention of fratricide on the battlefield. The proponents will review and update this action plan every six months until changes in doctrine, TTP and course POIs are accomplished. Many initiatives mentioned in this chapter stem from this action plan.

SECTION I: DOCTRINE AND TTP

DIRECT FIRE WEAPONS CONTROL MEASURES

Control measures tied to terrain features and battlefield events are as crucial to fratricide prevention as they are to synchronization. **Physically mark TRPs**, use ground-burning illumination, WP, beacons, colored smoke, strobes (w/IR filters), and identifiable Engagement Areas (EAs) to orient maneuver and fire (remember these techniques can be compromised over time). Another technique is to **use weapons control status similar to ADA for direct fires**. Weapons HOLD, TIGHT, or FREE would indicate the necessity of an external verification of the fire command or call for fire. A variant is status RED - Do Not Shoot or status GREEN - Shoot at Will. Depending on the level issuing the fire command, the next higher or adjacent echelon could be the verifying source. **Use detailed Rules of Engagement (ROE) to establish engagement criteria for various conditions soldiers might face**. For instance, tanks only engage dismounts when receiving effective ATGM or rocket fire and do not engage beyond 2000m. Other ROE might deal with when to load weapons and what the requirements are to clear direct fires by weapons type.

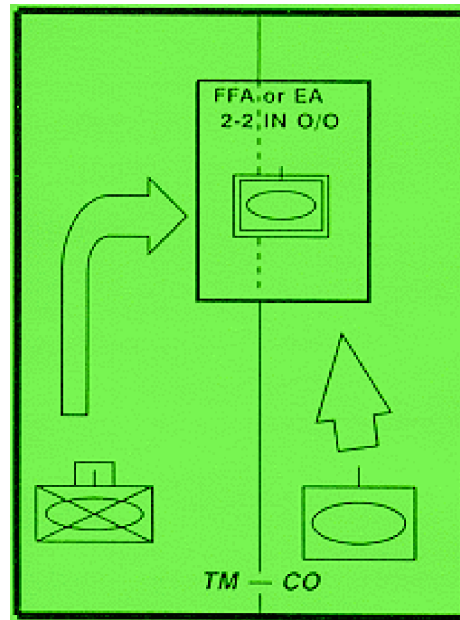
Rules of Engagement: Directives issued competent military authority that specify the circumstances and limitations under which forces will initiate and/or continue combat engagement with other forces encountered.

--FM 101-5-1

"The motto for direct fires in our brigade was - THINK, VERIFY, ENGAGE."

--Operation Desert Storm Bde S3

Use control measures that provide spacial separation between adjacent units. An example is to improvise a **variation** of a Free Fire Area (FFA) instead of the more common Restricted Fire Line (RFL) for converging forces in an enemy target of opportunity. In the example, the FFA becomes an engagement area for both elements, while reducing the chances of enemy or adjacent forces becoming intermingled. Priority and control of supporting fires would be situational, depending on existing boundaries, the main effort and best vantage point. Instituting a 1-km buffer zone along boundaries of adjacent major commands and Allied forces was successful Operation DESERT STORM technique coordinated through liaison officers. verification before engaging became a requirement in this zone. However, this technique would likely be infeasible in the defense or in restricted terrain.



Free Fire Area instead of just RFL or Boundary

MOUT CONSIDERATIONS

Urban terrain provides high potential for fratricide because of the likelihood of close quarters (high weapons density), recognition problems, and unfamiliar secondary effects of weapons. GLINT tape effectiveness was severely reduced in build-up areas during Operation JUST CAUSE due to ambient light. However, there were examples of effective use at ranges under 100m. **Soldiers also employed several ineffective and dangerous techniques to breach various fences, walls, and barred doors with grenades, rifle fire, and even anti-tank weapons.** Schedule opportunities to practice live-fire demolition and breaching techniques in realistic situations with actual munitions. Fire support also presented problems. Direct fire support, even from just a block away, is very difficult to control. In another Operation Just CAUSE example, mechanized forces providing fire support were told by brigade a light force had cleared a tall hotel building only to the second floor. In actual fact, it had cleared to the tenth floor and was fighting in a counter-sniper engagement. Seeing this fire and apparently some weapons protruding, the mechanized forces began to suppress. This drew return fire from the friendly light force for some seconds before coming under control. **All units must have routine techniques for conspicuously marking cleared rooms, floors, and buildings as they progress through an urban area.** These procedures must be automatic, practiced, and discernable at night so that soldiers understand them even with limited preparation time. also, during MOUT operations, **develop a numbering system for all buildings and landmarks to simplify coordination of maneuver and supporting fires.**

CLEARANCE OF INDIRECT FIRES

A recent white paper on this subject from the U.S. Army Field Artillery School states: "**The Fire Support Element (FSE) at the maneuver headquarters initiating the request for fires is responsible for obtaining internal clearance (clearance from subordinate units) and, as necessary, clearance from adjacent units in whose areas the targets lie.**" The white paper further details the lack of TTP available to the FSCOORD and maneuver commander. Although doctrinally acceptable within unit boundaries, **passive control (silence is consent) greatly increases the potential for fratricide**, due to the assumption of optimal communications and battle tracking. **CTC experience shows that there is no substitute for clearing fires through positive control and "eyes-on-target" observation at the lowest possible level.**

During Operation DESERT STORM, the standard procedure was absolute positive control of all fires, with the result of only one friendly fire incident. However, due to the ranges involved, direct observation was unlikely and responsiveness of fires suffered significantly in Southwest Asia. Fort Sill observes "**To be effective, procedures for achieving positive control must become a routine part of the planning, coordination, and rehearsal process for every tactical operation or mission.**" Many units have trouble integrating fire support effectively in rehearsals to assign control responsibilities, and this appeared recently as an unfavorable fire support trend at the JRTC. To achieve positive control, without sacrificing responsiveness, units should incorporate these lessons in training:

- Establish and practice routine positive controls (permissive controls to those who can see; restrictive measures protect those who are exposed).
- Establish simplified procedures for external (adjacent and higher) clearance of fires.
- Incorporate fire support members in liaison teams for **detailed** flank coordination at each level (even across higher boundaries, e.g., brigade HQ across a corps boundary).
- Establish procedures for manning rear CP FSEs and positive control in rear areas.
- Anticipate special controls needed for mixed voice-digital environments.

RECONNAISSANCE PRIORITIES

Properly executed reconnaissance can greatly reduce fratricide risk. Normally, priority intelligence requirements (PIR) relate to confining the enemy on the objective. In reducing the fratricide risk, **consider PIR relating to the feasibility of the routes, navigation and maneuver plan.** Identifying hazards and confirming fire control measures will help the commander continue to update his tactical estimate and reduce operational risk. Units during Operation DESERT STORM sometimes moved reconnaissance patrols to the flanks upon contact to reduce both the vulnerability of the reconnaissance patrol and the main body. **Allocating some reconnaissance capability to a flank vantage point for observation and reporting can enhance synchronization and command and control.**

REHEARSALS

Data from NTC rotations demonstrates that failure to plan, prepare and rehearse has a negative impact upon execution of the fire plan. A leader's preparation and supervision before battle is a critical element in reducing fratricide. **Rehearsals at all levels are key to understanding the concept of operation, verifying specific responsibilities, timing, and backup procedures to help synchronize unit operations.** For additional reading, see **CALL Newsletter 91-1, Rehearsals, Apr 91.**

NTC TF Direct Fire Rehearsal Trends

48.5% of units attempted rehearsals
54.5% of these were rated "effective"
12.2% established engagement priorities
3.4% executed established priorities
12.7% moved wpns based on rehearsals
79.7% underused rehearsal opportunities

Benefits of a good rehearsal:

- Well-understood fire control measures are established.
- Maneuver element locations and actions are well known.
- Information down to every soldier.
- Feedback to leaders results in refinements.
- Fratricide prevention measures are determined.
- Problems are identified and corrected.
- Increased soldier confidence and aggressiveness.
- Sense of partnership or ownership in the plan.

CONVENTIONAL AND SCATTERABLE MINEFIELD REPORTING

Experience at CMTC shows that fratricide from friendly minefields is a major problem due to lack of coordination, failure to disseminate obstacle plan, and failure to accurately report obstacle locations back up the chain. Operation DESSERT STORM was the first time scatterable mines were used by U.S. forces. Many units did not follow the doctrine for reporting, recording and marking of minefields. This was not only a joint problem between the Army and Air Force, but also an internal Army problem. FM 20-32, *Mine/Countermine Operations*, is under revision and will address scatterable minefield reporting, recording, marking and reorient emphasis from static barriers to dynamic (scatterable) barrier operations. Solutions include training with scatterable minefields in CPXs and FTXs; including minefield locations in your liaison officer (LO) checklists; and, development of a "flash" traffic format or quick report similar to NBC reports. **Note that any use of FASCAM (and possibly some use of dud-producing submunitions) requires appropriate reporting.** Although the Air Force delivered the GATOR missions mentioned in the Engineer School observation below "well beyond the Fire Support Coordination Line (FSCL)", this became a major problem when maneuver caused to FSCL to update rapidly to the north and east.

...Army planners released use of scatterable mines to component services without specifying the appropriate control measures as per doctrine. CENTCOM Air Force (CENTAF) flew over 35 GATOR missions (the exact number is not known), without reporting, or recording missions...During the ground offensive, units found themselves maneuvering in GATOR minefields, without any knowledge of their existence."

---U.S. Army Engineer School Operation DESERT STORM Observation

UNEXPLODED ORDNANCE (UXO)

During Operation DESERT STORM, the combined dud rate of multiple engagements with improved conventional munitions (APICM, DPICM, CBU's) cause obstacles and safety concerns for the maneuver commander. Some maneuver commanders hesitated to employ the munitions, especially if the unit might have to move through the area later. Soldiers were killed and wounded while handling unexploded submunitions. Some thought the rounds were "empty" because they appeared empty. Commanders can create Restricted Fire Areas (RFAs) where they anticipate subsequent maneuver to control this problem. Dud-producing missions would then require coordination with the maneuver headquarters. Depending upon the type of forces and fires involved, these missions would be restricted or carefully recorded. Our soldiers and junior leaders must be educated with both the safety and tactical knowledge that will prevent handling unexploded ordnance. **Finally, as with ammunition and pyrotechnics, leaders must not tolerate breaches of basic discipline in dealing with UXOs.**

DOCTRINAL INITIATIVES

Currently, no single Army publication fully addresses fratricide reduction. Two field manuals (FM 100-5 and FM 25-101) briefly mention the need to determine risk assessments and other "How To Fight" FM address fratricide with limited emphasis. Some Missions Training Plans (MTPs) address friendly fire in task and subtask standards. The forthcoming revision of FM 101-5 will address several related issues (liaison, fratricide reduction, and rehearsals) in greater detail. New training manuals should address, in high-risk missions, these collective task measures which help reduce fratricide. The collective task matrix for high-risk missions should include individual and vehicle recognition tasks.

SECTION II: TRAINING

COMBAT VEHICLE IDENTIFICATION (CVI) TRAINING

Several studies by Army Research Institute Filed Unit at Fort Hood provide conclusions useful to unit trainers responsible for gunner selection and training. In a series of CVI training tests of optical and thermal images from 1980 to 1985, these were some of the findings:

- * **Many soldiers lack the aptitude for CVI skills.** "Approximately one third of soldiers after four training trials failed to achieve the level of CVI proficiency reached by the other two thirds after one training trial."
- * **Don't key on vehicle details that the gunner could not realistically discern.** (e.g., bore evacuator position); this is counterproductive. "The quality of the combat vehicle's image is not a critical factor in identifying the vehicle or in learning identification skills provided gross cues (e.g., chassis shape, turret shape and position, relative length of gun tube) are discernible."
- * **Don't push for moving target CVI training.** "The use of motion depicting a vehicle is not critical in training CVI."
- * **Consider more frequent or more careful vision testing for combat vehicle gunners.** There was significant evidence of superior target identification performance for soldiers who wore glasses. "The inference [is] that many soldiers who do not currently wear glasses should be wearing glasses."
- * **Use "black-hot" as the normal thermal polarity setting.** Thermal identification studies "indicated that the black hot image was generally preferred for identification purposes, particularly at longer ranges." Another thermal technique recommended by experienced trainers and consistent with this study's findings: During scanning, continuously adjust and vary contrast, brightness and polarity to enhance possible identification features and gunner concentration.
- * **Predictably, there was a distinct correlation between high performance on CVI and higher GT score among tested soldiers.**

Several Graphic Training Aids resulted from this testing, and they may still be available at local TASCs. They are:

GTA 17-2-9	Cbt Veh ID Program:	35-mm photo image slides
GTA 17-2-10	Cbt Veh ID Program:	35-mm thermal image slides
GTA 17-2-11	Cbt Veh ID Program:	Photo image flash cards

Finally, a handbook of thermal images depicting friendly and threat vehicles at various ranges and conditions was distributed during Operation DESERT SHIELD by the Center for Night Vision and Electro-Optics. This book is still available through the CECOM point of contact shown and efforts are underway to introduce it into the training aids system.

DESERT STORM IR Guide II
Cdr, CECOM
ATTN: AMSEL-RD-NV-VMD-BSPT
Mr. Paul Orentas/Walt Morrow
Ft Belvoir, VA 22060
(703) 664 (DSN 354) 3498/3258

Train vehicle recognition (friendly vs threat) and identification (specific vehicle nomenclature) continually and in all environments. Treat it as a crew task and as an integral part of target acquisition and conduct of fire in M1-, M2/M3- and M901-equipped units. Include both clear optics and thermal recognition training.

ASSEMBLY AREA PROCEDURES

Fratricide risk reduction measures begin at the lowest level and frequently require minimal guidance. Use initiative; prepare detailed navigation plans. Make adjustments for adverse weather and terrain; devise command and control expedients; rehearse vectoring techniques. Train soldiers to know the distinguishing signatures between enemy and friendly forces. Recently, in preparing effectively for a difficult NTC mission, an East coast-based unit devised a lane for every brigade crew to view friendly combat vehicles under prevailing regional conditions.

BATTLE ROSTERING

Track fratricide prevention training and key crew experiences on your battle rosters. **Crews that have not undergone gunnery, force-on-force maneuver, or night operations are potentially fratricide prone--track these events and provide close supervision.** When selection gunners, consider screening for eyesight, CVI aptitude and GT score.

CREW DRILL OR BATTLEDRILL

Strive to make crew reactions instinctive, but include the component of assessment based upon all environmental factors. Consider a verification procedure to complement the existing process for any questionable engagement, reaction to contact, or call for fire. **Maintaining vehicle and turret orientation is a combat critical skill** and part of good situational awareness. In the absence of an azimuth indicator for the M1 tank, use expedients such as chalk marks on the turret ring or a chemical light hung on the driver's seat. At the unit level, periodic orienting rounds or beacons may be required. Frequently orient your vehicle with a compass (accuracy is more than adequate for general direction, but requires practice). When stationary, pickets 20 meters out are thermally visible sector limits for the gunner.

FRATRICIDE TRAINING TAPE

The U. S. Army Armor Center developed a fratricide reduction video tape for Armywide use. Ultimately, distribution will allow TASCs to provide copies to all combat arms battalions on long term loan. The tape:

- Shows thermal signature of U.S. and threat vehicles as seen by M1A1, BFV, AH64 and FIST-V optics.
- Shows BFV, BMP, HMMWV, BTR-60, LAV, M1A1 and T-72 thru-sight images at identifiable range and at 1,000 meter intervals to 4,000 meters.
- Shows tank crew view when being engaged by a tank main gun compared to observing impacting RPG fire.
- Describes crew actions upon receiving friendly fire or engaging friendly forces.
- Discusses fratricide risk assessment based on METT-T, fratricide preconditions, and risk reduction options.

The film also contains historical vignettes which identify some of the preconditions which have caused fratricide. The risk assessment example scenario discusses fratricide reduction during the planning, preparation and execution of a heavy task force movement to contact.

FRATRICIDE AWARENESS AND PREVENTION

PIN: 709861DA RELEASE: TVT 20-988
Available in your local TASC in 2d Qtr, FY 92

POC for assistance @ Combined Arms Command, Ft Leavenworth is CPT Hundley, ATZL-CTT, DSN: 552-2495/2939

TRAINING DEVICES, SIMULATIONS AND SIMULATORS

The production of the CVI interactive video disc, scheduled for fielding prior to the end of FY92, is approximately 50 percent complete and should promote positive vehicle identification. The video disk includes a thermal recognition section which replicates through-sight vehicle thermal images. A recent recommendation will widen the target audience of the course, now under development at the Infantry School, to include armor and aviation crew members. M1, M2 and M3 Conduct-of-Fire Trainer (COFT) simulators will continue to include increasingly realistic views of combat vehicles. COFT Instructor/Operators (I/Os) evaluating crew performance must critique crew performance if fratricide occurs and discuss causes of, and remedies for, fratricide with the evaluated crews.

FIELD TRAINING

Commanders normally incorporate doctrinal control measures in their maneuver plans. They must recognize certain situations and contributing factors (e.g., offense; limited visibility) which inherently create a greater risk of fratricide. Commanders should then integrate prevention measures into their plans. To reinforce, commanders must address this with their subordinates and the **train to minimize fratricidal risks without sacrificing mission success** (see Appendix A, Risk Assessment, and CALL Handbook No. 92-3, Apr 92, Fratricide Risk Assessment for Company Leadership).

"Crosstalk between...commanders on the...command net was outstanding, facilitating coordination along the flanks,...and...prevention of fratricide."

--Operation DESERT STORM Division Cdr

Two radio net techniques may be appropriate when fratricide risk is high. A technique used by the Israelis is to maintain one dedicated radio "mosquito" net that is monitored by all elements in the force (e.g., one vehicle per platoon or company) for emergency resolution of potential fratricide. This requires much overhead in radio hardware and a daily frequency or spare. An alternative technique, used in Vietnam, is to allocate one retrans in the battalion or brigade sector with the low side on the dedicated "guard" or "mosquito" net and the output on the local command net. Whenever elements have cause to use the emergency net, the command net is immediately involved.

During FTXs or CALFEXs, higher commanders can emphasize scenarios calling for coordination on the flank. As the scenario unfolds, they can then introduce "clues" that the tie-in on the flank is deteriorating (offense or defense). If the commander updates his risk assessment "in-stride" and takes action, he will not have a flank problem. If he takes no action, eventually a friendly force will drift inside his boundary or sector of fire. Whether or not fratricidal engagements occur, address the entire process in the AAR to refine and improve SOPs.

LIVE-FIRE

Field Manual 17-12-1, *Tank Gunnery*, allows the local commander the option to **include friendly target arrays in Combat Tables VI, VII, VIII and XII**. FM 23-1, *BFV Gunnery*, allows the same friendly target option for Bradley Tables V, VI, VII and VIII. Significant crew cuts are prescribed for engagement of friendly targets. As described in *Field Training* earlier, indicators or clues can be added to the scenario to reinforce risk assessment in the troop leading process. Unfortunately, the physical size of ranges and time limitations may discourage units from including friendly targets. However, **expending the effort provides the commander with an excellent means to stress fratricide prevention during training.**

Practice positive control of supporting fires in all collective live fires. Experiment with marking rounds or devices that are visible and identifiable to key weapon systems. As an example, units have had success designating targets for CAS using the artillery GVLLD. Aircraft equipped with PAVE PENNY optics can acquire the laser energy (as with Copperhead, requires advance coordination of coded laser frequencies). During otherwise adverse conditions, they can quickly orient on the target and engage confidently with their weapon of choice. **Knowing the technical positioning, targeting and destructive characteristics of supporting weapons systems (to include aircraft) is key to positive control.** Use heat-producing signals for systems with thermal primary optics like the Bradley, Abrams and Apache.

A technique derived from the procedure used by the NTC live-fire team could be used by the task force S3 or FSO to clear fires in live-fire exercises (LFXs) or combat. This involves **dividing the TF sector or zone into regions determined by the scheme of maneuver and terrain visibility. As maneuver elements enter these areas or occupy vantage points for them, these elements assume responsibility for clearing fires there.** Prior to that time, task force-level clearance will expedite responsiveness. **These clearances of fire prerogatives and relationships are then clarified with all elements during rehearsals and briefbacks.**

Most friendly fire casualties involved crews of armored vehicles struck by high velocity, nonexplosive tank rounds that rely on the force of impact to destroy the target. The number of deaths and injuries from these incidents would have been higher had it not been for the built-in safety and survivability features of the M1A1 tank and the Bradley Fighting Vehicle, such as fire suppression systems, blow-out panels, hardened armor and protective liners.

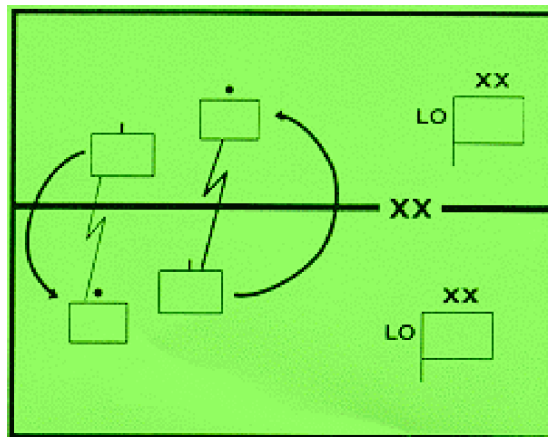
SECTION III: ORGANIZATION

LIAISON OFFICERS (LOs) AND LIAISON PARTIES

LOs' duties and responsibilities must be more than arriving at a predetermined location and exchanging graphics and company location. They must have good understanding of the commander's intent and scheme of maneuver to anticipate problems. **Combat AARs repeatedly attribute coordination successes to high-quality liaison teams.**

BOUNDARY COORDINATION TEAMS

A valuable coordination technique, particularly between Allied or coalition forces, involves cross-attaching small elements (preferably w/vehicles) between companies most likely to make direct contact across the boundary. In addition to normal liaison elements, **these teams are instrumental in resolving radio, SOI, language and coordination difficulties between adjacent forces.**



SECTION IV: MATERIEL

MATERIEL SOLUTIONS

Although technological navigation aids show much promise, currently there are no materiel solutions to the fratricide problem. Many individual items, such as those discussed in this section, are being aggressively examined by Army Materiel Command (AMC) and show varying degrees of promise. Their primary utility appears to be as aids in command and control, **not vehicle recognition**. Example **marking uses include**:

- TRPs or Engagement Area boundaries in limited visibility.
- Near side of friendly minefields or lanes.
- Guide beacon for vehicle positions, maneuver, march columns or passing units.
- Flank coordination and orientation.
- Front-line trace for close air missions.
- Friendly recognition at passage points or contact points.
- Deception operations.

An effective ground combat IFF system is a long-term development project. AMC has initiated intensive developmental efforts that will give us an interim IFF system in about three years. Meanwhile, various field expedient techniques, such as those mentioned below and used in Operation DESERT STORM, are proposed to augment existing flashlight and chemlight signaling capability. This is particularly true when units **use them in combination for redundancy**. Keep in mind these **general disadvantages**:

- Infrared (IR) sources are visible in a wide variety of IR viewers and are hard to discriminate from visible light sources.
- IR sources have little utility in daytime operations.
- IR sources are generally not visible in thermal sights.
- Pulsating sources (Budd/DARPA/beacon) can resemble machine gun fire.
- IR sources can have a blinding effect when used improperly on or around vehicle and personnel night sights.
- These devices are all difficult to positively screen from enemy air and ground detection.
- Their use as IFF would require identifiable arrays, changed daily with SOIs for OPSEC.

"QUICK-FIX" INITIATIVES

BUDD LIGHTS AND DARPA LIGHTS

These are both near IR strobe emitters for strap-on vehicle or soldier use. They are visible at night up to 6 to 8 kilometers using image-intensifying night vision devices. Both are susceptible to atmospheric attenuation and obscuration. Budd lights are smaller, more economical and use a simple 9-volt battery. DARPA lights are bigger and need seven "C" cell batteries, but have a somewhat adjustable beam.

THERMAL BEACON

These prototypes are essentially thermal "Whoopee lights," 24 inches high, which attach to the top of a combat vehicle, emitting a thermal signature in a strobe-like fashion. They are currently being examined for adaptation to combat vehicles. One test configuration causes the beacon to flash when a separate sensor detects incoming laser range finder energy. In their current design, they add a conspicuous physical presence to the vehicle outline and have a polished aluminum surface that flashes reflected sunlight during the day or bright moonlight at night.

THERMAL TAPE

A technical innovation called No Power Thermal Target (NPTT) material was used during Operation DESERT STORM. When viewed by a thermal sight at close range, NPTT material offers a distinct image that appears as the reverse polarity of the thermal image. When viewed by thermal sights in the white hot mode, the tape is seen as a black image on white vehicle background. ARCENT adopted it as the material of choice for a common theater-wide vehicle marking procedure. The inverted "V" was utilized since it could easily be understood by our Arab Allies as the number eight in Arabic. To be discernible at 2,000m, large panels (approx 2 x 2 feet) are necessary. Many practical problems arise in finding a smooth, clean, unobstructed surface at the right angle of presentation for any combat vehicle. Generally, the tape will appear to alter the outline of a vehicle, but not generate a specifically recognizable image. This may cause familiar vehicles to look unfamiliar (or potentially like enemy), but does not permit vehicle or unit recognition at long engagement ranges.

EXPEDIENT SOLUTIONS

Luminescent paint, GLINT tape (IR reflective) and chemical lights were used to mark vehicles during Operation DESERT STORM. These fixes were not as successful as NPTT, but they all contributed to the reduction of fratricide. Light forces have used GLINT tape more successfully. Other ideas include strobe lights with IR filters or Whoopee lights in No. 10 cans pointing upwards for aerial identification. GLINT tape on personnel in the jungle worked well for aerial ID during Operation JUST CAUSE; however, in built-up areas, ambient light degraded this technique.

"...they had like a point element for security coming up near and I [saw] people but didn't recognize them from enemy...so I pulled out and IR [infrared] beam and I shot across and got their GLINT tape to glow (in PVS 7s) so I knew it was friendly..."

--Post Operation JUST CAUSE Interview, Ranger Regt

COMBAT VEHICLE MARKING SYSTEM (CVMS)

The CVMS (draft Army Regulation 34-XX) establishes a single prescriptive standard for marking combat vehicles. The system uses numbers, chevrons and half chevrons on the side (20 x 20 inch) and back (30 x 30 inch) panels for combat vehicles. Features of the systems will aid command and control efforts by allowing quick and easy identification of combat units in the close battle. AR 34-XX was developed by Combined Arms Command-Training (CAC-T) and staffed with Major Army Commands (MACOMs), CTCs and TRADOC schools for review and comment. It is currently at HQDA for approval as an Army Regulation.

NAVIGATION AIDS

Several ground- and satellite-based navigation systems were employed in the Persian Gulf. Specifically, the Long Range Aide to Navigation (LORAN) and the Global Positioning System (GPS) were widely used for the first time by Army forces. These passive receivers generally triangulate from signals transmitted from either satellite or ground antennae arrays. Soldiers and aviators reported that these devices were invaluable in confirming location and maintaining orientation in the largely featureless Saudi desert. The Air Force had GPS for each of the 2,200 forward air controllers (FAC) working with ground forces and with many aircraft. Distribution to ground forces varied by unit, but was generally down to company commander level. Reports indicate that the ground-based systems were limited in range and, therefore, utility for offensive operations (the distant antennae selection within the receiver may some what alleviate this problem). The GPS was widely praised, but some aviators and ground operators reported erratic GPS performance under the Kuwait oil clouds. These navigation aids tested in the desert, and improved models are continuing to be fielded and have become an important element of field training.

SECTION V: LEADER AND SOLDIER DEVELOPMENT

AFTER ACTION REPORTS (AARs)

All AARs should **address fratricide whether or not it occurs**. Highlight near-fratricidal incidents and fire control successes. Discuss and capture techniques for fratricide reduction. Observer and controllers for FTX and external evaluation must analyze fratricide occurrences and include them as a discussion point during their exercise AARs (add fratricide numbers to AAR collection charts from the Mission Training Plan examples). **Each CTC has historically given major emphasis to this issue**. Following are specific examples:

Beginning with rotation 91-12, 8-21 Sep 91, the NTC **initiated the following enhanced fratricide prevention measures**:

- Emphasize fratricide at AARs by:
- reviewing planning, preparation and execution of incidents.
- determining why incidents took place.
- discussing ways to prevent like incidents.
- Integrate flank units and lost friendly vehicles into force-on-force scenarios.
- Introduce revised NTC Rules of Engagement (ROE) based upon fratricide potential.

JRTC procedures include the following:

- Addressed at D-90 O/C visit to player unit in the context of ROE and fratricide trends in training observations.
- Key topic in commander's briefback of order to emphasize as part of normal plan, preparation and execution.
- O/Cs highlight fratricide in coaching and teaching process during execution. Fratricide preconditions are stressed.
- AARs direct increased emphasis towards friendly fire incidents since Operation DESERT STORM. O/Cs continue to identify what happened, why and how it could have been prevented. Finally, the Take-Home Package documents fratricide throughout the rotation.

Recently the CTCs have been asked to capture data on fratricide incidents, contributing factors, and prevention techniques in a centralized effort to disseminate trend and improve unit performance. CALL provide these trends and lessons learned from this analysis to the field, branch schools and CTCs for maximum exposure.

FIELD DISCIPLINE

A final category of self-inflicted losses involves mistakes made with weapons and explosives. Only careful guidance at the lowest levels and supervision can control these preventable casualties. Enforcement of strict policies (ROE) on use of booby traps, weapons on safe, employment of Claymores and explosives and use of hand grenades can help to prevent fratricide.

Vignette: OPERATION JUST CAUSE: AIR SUPPORT

During limited visibility, a mechanized infantry unit participated in a coordinated attack on a sensitive target. The primary objective for light forces was a fortified position potentially containing enemy armored cars. The mechanized unit had a supporting objective adjacent to, and outside of, the enemy position's perimeter. An AC-130 gunship provided supporting fire with the following primary control measures:

- Friendly personnel marked with GLINT tape on top of helmet
- Friendly vehicles marked with GLINT tape (infrared visible)
- Air support suppresses within the main objective
- Air support freely engages any vehicle within the position
- Control adjustments through fire support channels

Smoke resulting from intense preparatory fires began to obscure much of the objective and the mechanized axis to the supporting objective. Consequently, the AC-130 gunner switched from his primary IR sight to alternate thermal sight. This improved the acquisition capability, but now the infrared-visible GLINT tape could not be seen in the thermal sight. In the course of orbiting the objective, the orientation of the perimeter became confused for the air support gunner. Without the confirmation of the GLINT tape, he acquired a friendly vehicle outside the position, but reported it inside the position. In accordance with the fire support coordination, fires were cleared and he engaged. Mistaking the friendly fire for the enemy mortar fire, the ground unit suffered several needless casualties prior to transmitting the appropriate alarm.

In many ways this incident reflects the unpredictable fog of war. However, it also reinforces the need for redundant, positive control measures even if improvisation is necessary. **In any future battlefield, a full range of recognizable, heat-producing signals must complement the visual ones that are more familiar. These can mark lead or flank vehicles, positions on the ground, firing limits, limits of advance or any other battlefield focal point.**

CHAPTER IV

NCO CORNER

BURDEN OF THE FIRST-LINE LEADER

In recent conflicts, and at the Combat Training Centers (CTCs), two contributing factors stand out in the vast majority of fratricide incidents...

- a soldier didn't know where he was on the ground.
- a soldier engaged without positively identifying his target.

All fratricides weigh heavily on the persons directly involved, and the first-line leader will likewise feel a heavy burden of responsibility. Only basic individual and collective training combined with available technology can address these two challenges of situational awareness.

LAND NAVIGATION

Our soldiers must be able to navigate in any terrain. Train them to be confident and technically competent, but also train them to be conscientious and thorough. Anything less is negligence.

Often, fratricide occurs when some leader fails to properly plan navigation and provide for easily obtainable confirmation. When someone says, "I never get lost!," ask to see his dead- reckoning plan, his alternate route, and his preplanned opportunities to confirm by resection or GPS. He probably intends to use terrain association at night, in the jungle. **Failure to demand *planned navigation* is a key mounted and dismounted navigation problem in many units.** Anticipate and plan for employing beacons, guides or radars to maneuver in the desert. Likewise, in the mountains, plan to perform resection from key vantage points. When navigation is critical or promises to be difficult, compensate by redundant measures. Redistribute positioning equipment; vector units with thermal sights and GSR; or conduct reconnaissance of routes in advance. The recurring incidence of fratricide in training and combat has underscored this bottom line: **Never be Complacent about Navigation!** Instill this in your soldiers.

COMBAT IDENTIFICATION

Although combat identification problems have a technological aspect, we leaders can also address the problem. Above and beyond training vehicle ID with flash cards, we can challenge our gunners and vehicle commanders with more realistic preparation. Use models and binoculars in broken terrain with smoke or in variable light conditions. Show partial outlines and photographs with realistic views. Demand more than just friend or foe as many vehicles could be on either side in a future conflict. In the assembly area between operations, view friendly vehicles with thermal sights at various ranges in daytime and at night. Although various quick-fix vehicle ID devices are being tested, experiment with local or SOP means to distinguish friendlies.

SOLDIER AND LEADER EXPERIENCE

Often our least experienced soldiers and junior leaders become the central figures in fratricide. Faced with unfamiliar or uncertain circumstances, they react improperly. This is where your aggressive training program and emphasis on crew integrity can make a difference. Pair new or

younger soldiers with more experienced ones. Then make crew drill or battle drills for your outfit a demanding routing under the most realistic conditions you can manage. This will decrease the probability of maneuver and direct fire control problems. Use the techniques in CALL Handbook No. 92-3 to help unseasoned leaders make decisions like veterans.

RECONNAISSANCE AND REPORTING

Victims of fratricide are frequently in elements detached from the main body for reconnaissance or security missions. Although they may know where they are, key players such as the fire support officer, adjacent unit tank commanders, and supporting aircraft may not. Tragedy occurs when leaders don't adequately plan, coordinate and brief these separate missions. Too often, we send the junior man with little specific guidance and no reaction plan for likely contingencies. Whether it be an OP or a LP, a patrol, a quartering party, or a scout section, all should receive at least a complete FRAGO and be confident that all friendlies know their situation. The last remaining safeguard is accurate, continuous reporting from the element as the situation develops.

Extract from CMTC NCO Troop Leading Notes:

7. Issue OPORD: Give the soldier what he needs. Who is to the front, on the left and right and behind me; when do we shoot, what do we shoot at first, when do we get the Hell out of the AO and where do we go when we do; who can I count on to cover my rear; whose rear do I have to cover; where can I go for help, and how do I get them to come to me; who is in charge and when does he take over for the next guy up; how do I get FPFs and artillery, and when; and finally, if everything falls apart, how do we keep communication and where is our fall-back position?

8. Supervise execution of orders: Tell your subordinates what you want, check what they are doing, listen to them, **THEN GET AT LEAST TWO HOURS SLEEP!** Let your number two guy run things for awhile, then relieve him so he can sleep. Enforce your sleep plan, day or night, but keep improving your situation. Make absolutely certain that someone is in charge and knows he is in charge. If someone else comes into your area (like a bulldozer or the Division CSM), put your next best guy in charge of him, and keep a grip on him all the time until he moves on to the next area and is handed off to them. **NO ONE WANDERS YOUR BATTLEFIELD AREA ALONE, NOT EVER,** not your men, strangers, support elements, Red Cross Candy Stripers, **NOBODY....**

Vignette: COMBAT TRAINING CENTER (CTC)

During a CTC defensive live-fire exercise, an element inadvertently engaged a friendly position on one flank, causing a casualty. As part of an aggressive scheme of maneuver, this element was detached on a forward security mission and then withdrew to reoccupy its primary defensive position after sunset. At this time, weapon systems were not accurately sited in accordance with position stakes, and the leader misidentified his left limit. This allowed him, in one of the first task force engagements, to acquire friendly positions on the flank and engage with regrettable consequences. Subsequent review indicated that the firing element leader was new to the unit, inexperienced and not fully qualified on the weapon system. This incident occurred, despite an adequate plan, redundant control measures (sectors of fire, positioning stakes, adequate graphics) and a previous daylight defense of the same position.

All combat leaders should review this incident, not as an exercise in hindsight, but in an effort to benefit from a comrade's error. Identify measures that increase unit competence and confidence, while further decreasing the likelihood of these fratricidal mistakes. Among others, **consider these measures:**

- * Choose seasoned individuals and elements for detached missions.
- * Plan opening engagements to exploit the abilities of your best crews and gunners.
- * Mark key fire control measures unmistakably and possibly register direct fires at critical phases to orient systems.
- * Avoid "modified" standards for weapons qualification or tables, and strive to meet or exceed requirements for field firing or LFXs.
- * Practice moves between positions in limited visibility and establish mechanisms to cross-check orientation.

APPENDIX A

OPERATIONAL RISK ASSESSMENT & MANAGEMENT: AN OVERVIEW

We have discussed the primary causes of fratricide and the consequences of adverse **preconditions and contributing factors**. Now we will describe the process by which the battalion commander and his staff **anticipate** these circumstances along with other risks, assess **the relative impact of each contributing factor**, and employ risk-reducing measures.

Address fratricide contributing factors, preconditions and other elements operational risk early in and throughout the decisionmaking process. You the commander must develop your concept for accomplishing a mission and provide commander's guidance, including your statement of intent, to the staff. Following the initial METT-T analysis, you must state where and to what extent you will accept risk. Commanders will refine guidance throughout war gaming, order development, rehearsals and execution. As part of accomplishing the mission while preserving combat power, you should eventually **identify and incorporate all necessary risk-reducing measures**.

According to FM 25-101, *Battle-Focused Training*, commanders must consider the following points when integrating risk assessment:

- Accept no unnecessary risks.
- Make risk decisions at the proper level.
- Accept risks if mission benefits outweigh the costs.

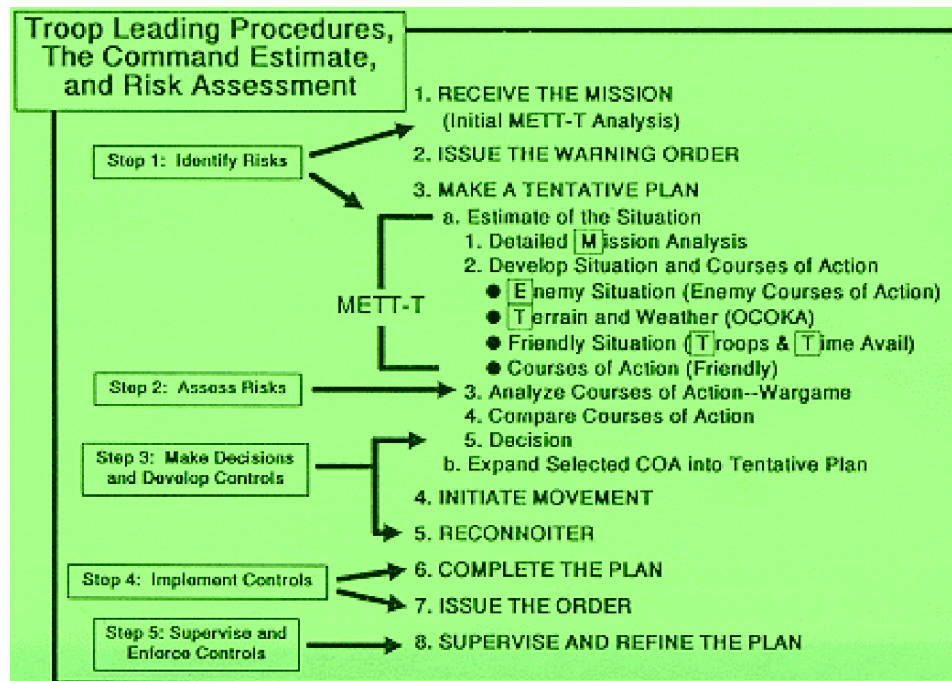
The risk assessment and management methodology we provide in this chapter will allow you to address the following steps outlined in FM 25-101:

1. **Identify** the risks [or hazards] using **METT-T** factors.
2. **Assess** possible loss, cost and probability.
3. Make decisions and **develop controls** to reduce [or eliminate] risks.
4. **Implement** controls by integrating them into plans, orders, SOPs, training performance standards and rehearsals.
5. Supervise and **enforce** at all times safety controls and standards.

"Risk Assessment is the Thought Process of Making Operations Safer *without* Compromising the Mission." --FM 25-101

RISK ASSESSMENT FOR BATTALION LEADERSHIP

Operational risk assessment helps leaders weigh the relative risk associated with each METT-T factor. Whether used for an actual combat operation or a training event, this thought process complements the commander's estimate phase of the decisionmaking process and can be a powerful tool for force protection. **Each organization must tailor the specifics of this mostly subjective analysis to its own strengths and vulnerabilities.** A single comprehensive, highly numeric approach cannot meet all units' needs under all circumstances. Adverse terrain and weather for a tank task force may be optimal for a light force. Adequate planning time for logistic operation may be marginal to high risk for an aviation cross-FLOT operation. Although this is a simplified approach for wide application, it exploits the potential of the war-gaming process and leader's experienced judgement.



METT-T:... the factors that must be considered during the planning or execution of a tactical operation. --FM 101-5-1, *Operational Terms and Symbols*

While countless individual factors impact upon risk levels, we offer METT-T as the logical structure to use during the staff planning process. **The commander should make necessarily subjective assessments of each factor, its related issues, and its impact.** He must consider the most probable enemy course of action and the worst-case alternatives with major branches and sequels. A proposed matrix structure for this METT-T risk analysis accompanies this chapter followed by an example of its application.

MISSION factors include those that elevate the command and control difficulties of executing your mission. Risk depends upon the answers to questions such as:

- Have soldiers and leaders done this before?
- Do we know our critical attachments?
- Are assigned tasks and commander's intent simple or complex?
- Do we have a simple, decisive, synchronized plan?
- What is the **MISSION**-related **FRATRICIDE** risk (**converging forces, weapons density**)?

There is inherent risk in enemy contact and **ENEMY** factors may generally apply to other areas of **METT-T** as a perceived enemy strength or advantage. Address these questions only once in your **METT-T** analysis (for training and Live-Fire Exercises (LFXs), apply factors as appropriate for **OPFOR** and targetry):

- Do we know the enemy's strength and options?
- What key terrain and weather advantages help the enemy?
- Are enemy soldiers in any way superior?
- Is enemy equipment in any way superior? Threat air or ADA?
- What was the enemy preparation time? **How fast can he react?**
- Are enemy equipment and uniforms similar to friendly and Allied?

"The commander's decisions are based on his analysis of the factors of **METT-T, staff input, information gained through reconnaissance, analysis and comparison of feasible courses of action, war gaming and his personal judgement." --FM71-2**

The degree of risk to your force from **TERRAIN and WEATHER** factors stems from your answers to questions such as:

- What crucial **OCOKA** factors increase risk?
- Is navigation tricky or decisive?
- How do engagement and identification ranges compare?
- Is terrain familiar or foreign?
- What known battlefield hazards exist?
- What is the likelihood and impact of obscuration?
- What is the weather impact on soldiers and equipment?
- What is the **TERRAIN-** and **WEATHER**-related **FRATRICIDE** risk (**visibility**)?

TROOPS is a key area in which leaders assess all aspects of soldier readiness not associated with time available for one mission:

- Are we physically prepared? Soldier and Leader condition?
- Individual Proficiency in Combat ID, Rules of Engagement (ROE), direct fire SOPs?
- Are subunits experienced and proficient in collective tasks?
- Are our soldiers confident in themselves and their leaders?
- Are our attachments proficient and experienced?
- Is this Task Organization **READY** for this mission?
- What is the TROOPS-related FRATRICIDE risk (**fatigue, Rules of Engagement**)?

The availability of mission-related **EQUIPMENT** (not aggregated readiness rates or C- ratings) can dramatically affect your operational risk -- consider these questions:

- What is the distribution and reliability of...
 - Night-Vision Equipment
 - Range Finders or Laser Designators
 - Navigation Equipment (GPS or PADS)
 - IFF Expedients
 - Batteries (NVDs, GPS, Commo, etc.)
- Is communication capability redundant or robust?
- Do we know our own weapons effects or limitations?
- Can we sustain our effort?
- What is the EQUIPMENT-related FRATRICIDE risk (**weapons effects, equipment backups**)?

"Anticipate events on the Battlefield." --AirLand Battle Imperative, FM 100-5

The amount of **TIME AVAILABLE** to you will decisively impact on any mission. Important associated questions are:

- What are the current considerations and constraints on time and pace of the operation?
- Will continuous operations impact soldier or leader endurance?
- Is preparation time adequate?
- Does time permit reconnaissance success?
- What is the TIME-related FRATRICIDE risk (**rehearsals, soldier and leader rest**)?

After assessing each METT-T factor, you and the battle staff can consider specific measures to mitigate the risks identified. Incorporate these controls into the plan and rehearsals as appropriate. Remember, the cost-benefit analysis may dictate **not** using additional controls. In this case, heightened risk awareness is an automatic measure. We recommend a standardized approach with questions tailored to your organization. This will help you to perform operational risk assessment and develop general guidelines for risk-reducing measures. Eventually, many techniques will warrant inclusion in your unit and section SOPs. **As with the Troop-Leading Procedures, the final phase of Risk Assessment and Management is to supervise and enforce the provisions of the plan. During execution, as significant components of the estimate change, you the commander will need to reconsider risk levels and reduction measures currently in place. This continuing "in-stride" assessment of risk is an integral component of the Command and Control Battlefield Operating System (BOS).**

This discussion reflects the combined efforts of several proponent schools and organizations within TRADOC. We have also published a combined arms command approach for company-level fratricide risk assessment that complements this discussion. We solicit feedback from organizations in the field and in the training base. If you try this or another means of addressing the risk of fratricide or other operational risks during the Troop-Leading Process, please send us your comments for review and dissemination in future CALL products.

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Combined Arms Command
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"Risk Management is Smart Decisionmaking." --FM 25-101

FRATRICIDE CONTRIBUTING FACTORS

(OR PRECONDITIONS)

MISSION (and C2):

Nature of Operation

Complexity of Plan or Intent

Adequacy of Reconnaissance

Direct Fire Control Plan or Measures?

Adjacent Forces Intermingled

360 Fight?

Are we the flank unit?

Unit position with respect to main body

Weapons systems density

Converging Forces

Are stragglers present?

Control of Space

Rules of Engagement

Communication or Reporting Failures

Crosstalk Lacking

Synchronization failure

Detached or Reconnaissance Element involved

Dissemination of Plan

LOs or Adequacy of adjacent unit coordination

Guidance to Attached or Detached elements

Disruption of C2

Feasibility of Fratricide Risk Reduction

ENEMY:

Enemy or Friendly Forces Intermingled

Enemy has similar equipment

Enemy activity

TERRAIN:

Day versus Night

NBC environment

Land Navigation

Terrain (OCOKA)

Orienting Terrain

Engagement Ranges

Compartmented vs Featureless terrain

Obscuration (Fog, Smoke, Dust)

Precipitation

Battlefield hazards (unrecorded or marked minefields, submunitions, etc.)

TROOPS and EQUIPMENT:

Individual proficiency and experience

Collective proficiency

Leader competence

Leader Experience (seasoning)

Situational Awareness

Rehearsals Adequate

Clearance of Artillery Fires

Fatigue or Physical Condition or Endurance

Effective SOPs

Acclimation to region

Habitual Attachments

Location of Tactical Air Control Party

Weapons Errors (Accidents, charge errors, wrong deflection, etc.)

Unit manning level

Soldier's Load

Anxiety, Confusion, Fear

Combat Identification (ground to ground and air to ground)

Friendly Weapons effects (Penetration, blast, ricochet)

Communication Redundancy

Availability of Protective Equipment

(MOPP, Flack Vests, Hazardous material)

Availability of Task-Related Equipment

Availability of Navigation and Positioning Equipment

IFF expedient for ground forces

TIME:

Planning Time

Continuous operations with minimal sleep

Continuous operations without sleep

Operation Duration and Intensity of Operation

Soldier and Leader Rest

APPENDIX B: FRATRICIDE RISK ASSESSMENT MATRIX

(From CALL Handbook, 92-3)

SITUATIONAL AWARENESS

FIRE & MANEUVER CONTROL				RATING
DENSITY OF FORCES	CLARITY OF THE SITUATION			
	Maintain Force Separation	Forces Converge	Forces Intermingle	
Heavy	5	7	9	
Normal	3	5	7	
Sparse	1	3	5	

FIRE DISTRIBUTION PLAN				RATING
PREP TIME REHEARSALS DISSEMINATION	COLLECTIVE PROFICIENCY			
	Strong SOPs Hab Attchmnts	Mod Trained or Fam Tsk Org	Unseasoned & Unfam Tsk Org	
	Brief back Rehearsals	3	4	5
	Reduced Force Rehearsals	2	3	4
	Full Force Rehearsals	1	2	3

LAND NAVIGATION				RATING
EXTENT OF RECON & IPB	VISIBILITY & NAVIGATION DIFFICULTY			
	Ample Controls High Confidence	Confidence with Much Effort	Very Difficult Low Confidence	
Minimal	3	4	5	
Limited	2	3	4	
Extensive	1	2	3	

FIRE CONTROL & BATTLE TRACKING				RATING
CLEARANCE OF FIRES	COMMO & CROSSTALK			
	Reliable Redundant	Adequate Means	Unreliable No Backups	
Passive Only	21	23	25	
Positive	1	3	5	

BATTLEFIELD HAZARDS				RATING
USE OF ADD'L DUD- PRODUCING MUNITIONS	KNOWLEDGE OF EXISTING HAZARDS			
	Extensive	Partial	Extremely Limited	
	Unknown	3	4	5
	Major	2	3	4
	Minor	1	2	3

POSITIVE IDENTIFICATION

COMBAT IDENTIFICATION				RATING
ENGAGEMENT RANGES & FIELDS OF FIRE	FRIENDLY RECOGNITION & MARKING SYS			
	Practiced Very Effective	Expedient Some- what Effective	Marginally Effective	
	ID Unlikely	3	6	7
	Marginal ID	2	4	5
	Optimal ID	1	2	3

DISCIPLINE

FIRE CONTROL DISCIPLINE				RATING
COMMAND & CONTROL OR SUPERVISION	RULES OF ENGAGEMENT (ROE)			
	Complete & Effective	Complete Some- what Effective	Expedient Untested	
Ad Hoc- Improvised	4	5	7	
Attached	2	4	5	
Organic	1	2	3	

TROOPS

SOLDIER & LEADER PREPAREDNESS				RATING
MISSION-RELATED EXPERIENCE & COMPETENCE	SOLDIER & LEADER FATIGUE			
	Rested Low Exertion	Mod Rest & Exertion	Limited Rest High Exertion	
	Unseasoned	5	7	9
	Moderate Experience	3	5	7
	Highly Experienced	1	3	5

LOW RISK	CAUTION	HIGH RISK	TOTAL
8 to 20	21 to 30	> 30	

FRATRICIDE Risk Reduction Measures	<div> Routine Measures <div> → </div> </div>		
	Low Risk	Caution	Extraordinary Measures High Risk
● FIRE AND MANEUVER CONTROL	Brief Backs Supervision PMCS & Pre Combat Checks	Lim Vis Rehearsal Reinforce Clear Intent Cross-Level/Consolidate Equip	Converging/Adj Forces Rehearsal Task Force Rehearsal
● FIRE DISTRIBUTION PLAN	Extensive Rehearsals SOPs Synchronization Matrix	Modify Task Organization Some Direct Fire Units-Wpns Hold or Tight Limited Visibility Plan	Multiple Synchronization Rehearsals Modify Plan Limited Objectives
● LAND NAVIGATION	Detailed Navigation Plan Reconnaissance Confirms Impact of Terrain-Weather-Enemy	Ground Guides/Night Vision Aids Redundant Navigation Aids Marking Enemy Positions	Multi-Echelon Navigation Extensive Recon/Centralization Reduce Equipment Dependence
● FIRE CONTROL AND BATTLE TRACKING	Positive Clearance of Fires Commo Checks Fire Support Rehearsal	Positive Clearance of Fires Restrictive Control Measures SOP Guides/Beacons/Vectoring	POSITIVE Clearance of Fires More Leaders Forward Redundant Commo Provide Backups
● BATTLEFIELD HAZARDS	Safety Discipline Disseminate Known Hazards	Vehicle Hazards Considered Rehearse React to Hazard Review Equip Limitations	Add Intermediate Objectives Special Log/Maint Actions Detailed Deception
● COMBAT IDENTIFICATION	Sustain CVI Skills Boresight Cbt Vehicle Recognition Sys	CBT ID Enhancements IFF Expedients for Exposed Elements	Clear IR Friendly Marking Multiple Recognition Signals
● FIRE CONTROL DISCIPLINE	Review ROE Challenge/Password Discipline Inspections Buddy System	Lighten Load/Review Equip List Simplified Plan Simplicity/Repetition Modify ROE	Interim Halts/Assessments Challenge/Password Enhancements Rotate High Stress Positions
● SOLDIER AND LEADER PREPAREDNESS	Address Seasonal Hazards Sustainment Training Sustain Morale Full Troop Leading Process Sleep Plan	Max Use of Transport Abbreviated Troop Leading Process Refresh Mission Specific Skills Controlled Pace in Execution	Priority of Tasks Priority of Rehearsals FRAGO only for Efficiency Request Additional Combat Power Don't Exceed Tng Proficiency

APPENDIX C

FRATRICIDE REDUCTION MEASURES**

Mission

Tactically Sound and Simple Scheme of Maneuver
Complete and Concise Orders
Doctrinally correct clearance of fires
CPs and TOCs accurately track the battle; render timely reports
Maintain graphics two levels down
Use large scale battalion and brigade sector sketches for detail
Coordinate with adjacent units; track adjacent battle
Subcompartment sectors and assign responsibility during LIC
Aviation and maneuver elements must coordinate and communicate
Get Air Tasking Order day prior and see what's flying
FA Bn HHB Cdr clears fires around BSA--he is FSO for the FSB
Only allow the QRF in the BSA perimeter
SOCCE is the key to coordination of SOF and conventional unit maneuver
Anticipate or assess fratricide risk during planning
Send key leader on objective reconnaissance--(e.g., squad leader from lead platoon)

Enemy

Know enemy characteristics and equipment
Know hostile criteria and enemy aircraft flight profiles
Additional recognition signals or markers

Terrain

Navigate Accurately--Know your Location
Fire control measures on identifiable terrain
Unit boundaries on identifiable terrain
OCOKA Analysis to identify fratricide risk
Redundant navigation aids or checks
Control the MSR--Know what should be on it and what shouldn't

Troops and Equipment

Always Rehearse--Don't accept excuses
Consider Limited visibility rehearsal
Situational Awareness--Units, Enemy, Hazards
Know your weapon and vehicle orientation
Anticipate where weapon system density will be highest
Recognize Battlefield Stress
Use validated SOPs to simplify operations
Know Rules of Engagement
Accurate and timely spot reports
Positive Target Identification--Don't shoot first, ask questions later
Sustain good aircraft identification training program
Train BSA troops in threat ID and survivability skills
Know friendly weapons effects
Train worst-case MOUT--flimsy structures or high fragmentation

Time

Maximize Planning Time
Prioritize Tasks or Rehearsals or Reconnaissance
Multiple WARNORDs and FRAGOs to save time
Adjust pace and Tempo

****Derived from JRTC "Tips to Prevent Fratricide" and TRADOC Fratricide Prevention Measures**

APPENDIX D: 20th CENTURY FRATRICIDE STATISTICS

(Combat Studies Institute, LTC Charles Schrader, 1982)

20th Century Fratricide Incidents--Cbt Studies Institute 1982 Schrader Study																			
Ground	Visibility			Total	Ground Operation					Total	Type Error							Total	Ground
58=21%	Norm	Lmtd	Unk	Events	Def	Off	Patrl	Retro	Unk	Events	Coord	Mis-ID	Disci				Unk	Events	
WWII-EUR	7	8	3	18	6	11		1		18	3	12	1				2	18	WWII-EUR
WWII-PAC	8	5	3	16	1	15				16	12		4					16	WWII-PAC
KOREA	1	2	1	4	1	2		1		4	1	1	2					4	KOREA
V.NAM	2	12	6	20	7	1	8		4	20	10	2	4				4	20	V.NAM
Total	18	27	13	58	15	29	8	2	4	58	26	15	11				6	58	Total
%	31%	47%	22%	100%	26%	50%	14%	3%	7%	100%	45%	26%	19%				10%	100%	%

Artillery	Visibility			Total	Ground Operation					Total	Type Error							Total	Artillery
98=36%	Norm	Lmtd	Unk	Events	Def	Off	Patrl	Retro	Unk	Events	Coord	Mis-ID	Mech	FDC	Crew	FO	Unk	Events	
WWII-EUR	9	7	4	20	3	13	1	2	1	20	10			1			9	20	WWII-EUR
WWII-PAC	18	4	6	28	5	21	1	1		28	13	2	1				12	28	WWII-PAC
KOREA		3		3	3					3	2						1	3	KOREA
V.NAM	2	11	34	47	16	5	3		23	47	7	1	4	4	9	9	13	47	V.NAM
Total	29	25	44	98	27	39	5	3	24	98	32	3	5	5	9	9	35	98	Total
%	30%	26%	45%	100%	28%	40%	5%	3%	24%	100%	33%	3%	5%	5%	9%	9%	36%	100%	%

AirGrnd	Visibility			Total	Ground Operation					Total	Type Error							Total	AirGrnd
99=37%	Norm	Lmtd	Unk	Events	Def	Off	Patrl	Retro	Unk	Events	Coord	Mis-ID	Mech	Crew			Unk	Events	
WWII-EUR	18	25	10	53	5	39			9	53	10	8	4	13			18	53	WWII-EUR
WWII-PAC	17		7	24		18			6	24	3	1		3			17	24	WWII-PAC
V.NAM	1	6	15	22	2	5	1	1	13	22	10	2	2	7			1	22	V.NAM
Total	36	31	32	99	7	62	1	1	28	99	23	11	6	23			36	99	Total
%	36%	31%	32%	100%	7%	63%	1%	1%	28%	100%	23%	11%	6%	23%			36%	100%	%

Anti-Air	Visibility			Total	Ground Operation					Total	Type Error							Total	Anti-Air
15=6%	Norm	Lmtd	Unk	Events	Def	Off	Patrl	Retro	Unk	Events	Coord	Mis-ID	Disci				Unk	Events	
WWII-EUR		4	2	6	1	3		2		6	1	1	4					6	WWII-EUR
WWII-PAC	4	2	2	8		7			1	8	4	2	2					8	WWII-PAC
V.NAM		1		1	1					1			1					1	V.NAM
Total	4	7	4	15	2	10		2	1	15	5	3	7					15	Total
%	27%	47%	27%	100%	13%	67%		13%	7%	100%	33%	20%	47%					100%	%

APPENDIX E

TRADOC AND CALL FRATRICIDE STUDY (Fratricide Rates by Mission Type, 1986-1988)

NTC CALL TRADOC Study (1986-1988)

Fratricide by Mission	Frat/MP	%Frat	Kills/MP	%Frat Kills
Defend Battle Position	45/639	7.0%	18/639	2.8%
Defense in Sector	123/2190	5.6%	67/2190	3.1%
Hasty Attack	14/154	9.1%	5/154	3.2%
Movement to Contact	92/644	14.3%	45/644	7.0%
Reconnaissance	49/333	14.7%	24/333	7.2%
Counterattack	38/240	15.8%	22/240	9.2%
Deliberate Attack	183/720	25.4%	104/720	14.4%
AVERAGE	544/4920	11.0%	285/4920	5.8%

The NTC instrumentation can 'match' the firer with the target and highlight fratricidal matched pairs (MP) for many engagements (25-40% of the time). This study shows the relative risk of fratricide by mission type. It also shows the relationship between fratricidal engagements that are MILES kills and all engagements to include near misses (52%). These fratricide percentages may not apply to all engagements, but even the 544 total recorded friend-on-friend engagements in two years is too high.

**285/544=Kills/Total Frat=52%*

APPENDIX F

FRATRICIDE REDUCTION LESSON PLAN

I. Definition

II. Primary Causes of Fratricide

- A. Direct fire control
- B. Land navigation
- C. Combat Identification
- D. Inadequate control measures
- E. Reporting or Communication problems
- F. Weapons errors
- G. Battlefield Hazards

III. Effects of Fratricide

- A. Loss of confidence
- B. Leader self-doubt
- C. Hesitation
- D. Over command and control
- E. Loss of aggressiveness
- F. Loss of initiative
- G. Disrupted operations
- H. Degradation of cohesion, morale and combat power

IV. Reduction Measures

A. Tactics, Techniques and Procedures

- 1. Combat identification training
- 2. Assembly area procedures
- 3. Crew drill or battle drill
- 4. Training devices
- 5. Rehearsals
- 6. Reconnaissance Priorities
- 7. Field training
- 8. Live fire
- 9. Training literature

B. Equipment Solutions

- 1. Thermal beacons
- 2. Thermal tape
- 3. Navigation aids
- 4. Combat Vehicle Marketing System
- 5. Combat Identification Marking System

USE THIS LESSON PLAN AS A TRAINING TOOL TO PLAN AND PREPARE YOUR INITIAL FRATRICIDE REDUCTION CLASS. THIS NEWSLETTER CONTAINS SUPPORTING INFORMATION TO ASSIST YOU WITH YOUR CLASS.

APPENDIX G: COURSE OF ACTION (COA) DECISION MATRIX

(Generic Example Incorporating Risk Considerations)

Significant Factors	COA #1	COA #2	COA #3
Dispositions			
Obstacles			
Terrain			
Surprise			
Flexibility			
Speed			
Mass	<p>Although there are many ways of analyzing Courses of Action (COA) during the staff planning process, most units develop a standard procedure. In this example, the commander determines that operational risk and the risk of fratricide are significant factors with respect to this mission. He will consider them when selecting the best course of action. As with any adverse factor associated with the COA he picks, the commander will take measures to reduce the likelihood of a precondition for fratricide.</p>		
Soldier's Load			
Supporting Atk			
Fratricide Risk			
Operational Risk			
Total			

Note: TRADOC Command Safety Office derived this generic example from FM 101-5, pg E-9, and FM 7-10, pg 2-32.

APPENDIX H: WEAPON AND NIGHT ACQUISITION TEMPLATE Friendly/Threat Weapons Ranges and Night Vision Planning Factors (Not to Scale)

